CLAIMS

1. A virtual pressure sensor for a Common Rail injection system of an endothermic engine, the injection system comprising: at least one fuel pressure accumulating tank, of the rail type, having an input in fluid communication with a high-pressure pump and a plurality of outputs for feeding corresponding injectors by using a pressure regulating means connected and depending on an electronic control unit, and which includes a fluid-dynamic model of said accumulating tank to estimate and to obtain fluid pressure values used by said electronic control unit for driving the injectors of said Common Rail injection system.

2. The virtual pressure sensor of claim 1 wherein the fluid-dynamic model of said accumulating tank provides models of sections of said accumulating tank and sections corresponding to said injectors.

3. The virtual pressure sensor of claim 1 wherein said fluid-dynamic model of said accumulating tank enables the electronic control unit to calculate the pressure value at each injector dynamically, while said endothermic engine is running.

4. The virtual pressure sensor of claim 1 wherein through the fluid-dynamic model, said accumulating tank is schematized in the pressure regulating means by a cascade of subsystems in fluid communication with one another, each subsystem comprises a first input terminal and first output terminal, as well as a second input terminal connected to said electronic control unit and a second output terminal arranged to supply a pressure value.

5. The virtual pressure sensor of claim 4 wherein said first input terminal of a first subsystem of said cascade of subsystems is connected to a bus interfacing to said electronic control unit.

6. The virtual pressure sensor of claim 5 wherein said second input terminals of said subsystems are connected to a demultiplexer, the latter connected in turn to said interfacing bus.

7. The virtual pressure sensor of claim 5 wherein said second output terminals of said subsystems are connected to a multiplexer, the latter connected in turn to said interfacing bus.

8. The virtual pressure sensor of claim 5 wherein said electronic control unit supplies said interfacing bus with a signal corresponding to a pressure set by the accumulating tank and an injection law, and receives from it a signal corresponding to an estimation of the actual pressure in said accumulating tank at said injectors, as estimated by said fluid-dynamic model.

9. A common rail injection system for an endothermic engine, the injection system comprising:

at least one fuel pressure accumulating tank coupled to at least one injector;

a pressure regulating means coupled to an electronic control unit and to each at least one injector, the pressure regulating means configured with a fluid-dynamic model of the accumulating tank to estimate and to obtain fluid pressure values that are transmitted to the electronic control unit for driving the at least one injector.

10. The system of claim 9, further comprising an interface bus coupling the electronic control unit to the at least one injector, the electronic control unit configured to supply the interfacing bus with a signal corresponding to a pressure set by the accumulating tank and an injection law, and to receive from the interfacing bus a signal corresponding to an estimation of the actual pressure in the accumulating tank at the injectors as generated in accordance with the fluid-dynamic model.

11. The system of claim 10 wherein the electronic control unit is enabled by the fluid-dynamic model of the pressure regulating means to dynamically calculate the pressure value of each injector while the endothermic engine is running.

12. A pressure regulating system for a common rail fuel injection system of an endothermic engine having at least one fuel pressure accumulating tank of the rail type coupled to a plurality of injectors, the accumulating tank having an input in fluid communication with a high-pressure fuel pump and a plurality of outputs for feeding fuel to the corresponding injectors, the pressure regulating system comprising:

an electronic control unit;

an interface coupled to the electronic control unit; and

a plurality of pressure regulator models each pressure regulator model coupled to the interface and to a respective injector, the pressure regulator model configured with a fluid-dynamic model of the accumulating tank to estimate and to obtain fluid pressure values that are transmitted via the interface bus to the electronic control unit for driving the plurality of injectors.

13. The system of claim 12 wherein the electronic control unit is configured to supply the interfacing bus with a signal corresponding to a pressure set by the accumulating tank and an injection law, and to receive from the interfacing bus a signal corresponding to an of the actual pressure of the accumulating tank at the injectors.

14. The system of claim 13 wherein each injector is in fluid communication with other injectors and comprises a first input terminal and a first output terminal, a second input terminal coupled to the electronic control unit and a second output terminal configured to supply a pressure value to the interface bus.

15. A pressure regulating system for a common rail fuel injection system of an endothermic engine having at least one fuel pressure accumulating tank of the rail type and a plurality of injectors coupled to the accumulating tank for receiving fuel therefrom, the pressure regulating system comprising:

an electronic control unit;

an interface bus coupled to the electronic control unit for bi-directional communication;

a plurality of pressure regulator models, each pressure regulator model coupled to a respective fuel injector, and each injector in fluid communication with other injectors, each injector coupled to the interface bus and configured to generate an estimation signal on a first pressure output that is transmitted to the interface bus for use by the electronic control unit in driving the injectors, a first input terminal coupled to the interface for receiving a current injection law, a second input terminal configured to receive a signal from a fuel injector, and a second output terminal coupled to another fuel injector and configured to deliver pressure signals to the other injector;

the interfacing bus having an output coupled to a first injector to receive a signal from the electronic control unit corresponding to a pressure set by the accumulating tank and an injection law that is also received at the first input of each injector.

16. The system of claim 15 wherein the first input of each pressure injector is coupled to the interfacing bus via a multiplexer.

17. The system of claim 15 wherein the first output of each injector pressure regulator is coupled to the interfacing bus via a multiplexer.

18. The system of claim 15 wherein the fluid dynamic model of the accumulating tank is configured to generate models of sections of the accumulating tank and sections corresponding to each of the plurality of injectors.

19. The system of claim 15 wherein the fluid-dynamic model of the accumulating tank is configured to enable the electronic control unit to calculate the pressure value of each injector dynamically while the endothermic engine is running.